Who Disciplines Bank Managers?

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Abstract

The ongoing financial crisis casts doubts on whether market participants can effectively discipline banks. We bring to bear a hand-collected dataset of executive turnovers in small and medium sized commercial banks in the United States in 1990–2007 to focus on the effectiveness of the ultimate disciplining device: the threat that a top bank manager is fired. Our sampling period allows an in-depth exploration of how different stakeholders penalize unsound bank managers over time in light of the increasing supervisory emphasis on market discipline. We isolate the roles of debtholders, shareholders, and regulators to examine who can most effectively discipline bank executives. Our results constitute novel evidence that executives are more likely to be removed if their bank is financially weak, and this effect is stronger for banks that are subject to discipline from subordinated debtholders. We find relatively little evidence that other forms of discipline, in particular discipline exerted by shareholders and depositors, play a substantial role in influencing bank soundness.

JEL Classification Numbers: C41, G21, G28, L11

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"It is my judgment that given the size of the recent losses in our mortgage- backed securities business, the only honorable course for me to take as chief executive officer is to step down,"

Chuck Prince, announcing his resignation as Citigroup CEO (11/4/2007)

"John is a great banker, unfortunately he'd never been through the tough times of banking right now. … He's not as seasoned as what we need in today's banking climate."

A board member commenting on the departure of Riverside Bank CEO John Moran (6/10/2008)

I. INTRODUCTION

Major losses incurred by a range of U.S. banks have led to a number of forced departures of bank executives. This included some highly-publicized management turnovers at widely-known institutions, such as Citigroup, Merrill Lynch, Wachovia, Washington Mutual, SunTrust Bank, and Bank One. In addition to these high-profile events that captured public attention, there have also been media reports on numerous executive turnovers at smaller and perhaps less widely known banks, such as Douglass National Bank, Provident Bank of Maryland, Parkway Bank, and Bank of Albuquerque.[1] Clearly, replacing a bank executive is one of the critical decisions taken by the board of directors of the bank, and the bank's financial soundness is likely to be a substantial factor in that decision.

Supervisory authorities have attempted to complement regulatory discipline with market discipline as a tool of limiting the risk of costly bank failures (e.g., Park and Peristiani, 1998, 2007; Flannery, 1998; Berger, Davies, and Flannery, 2000; Shadow Financial Regulatory Committee, 2000; Hancock and Kwast, 2001; Martinez Peria and Schmukler, 2001; Maechler and McDill, 2006; Ashcraft, 2008). Market discipline has two distinct dimensions: market participants' ability to monitor changes in bank condition, and their ability to influence a bank's actions (Flannery, 2001, 2007, 2008). In this article, we focus attention on the second aspect, and analyze the effectiveness of the ultimate management-disciplining device: the threat that the manager gets fired.

Ideally, the different stakeholders (i.e., shareholders, debtholders, and supervisors that monitor banks and their executives) would exert sufficient discipline well before a bank experiences serious distress, pressuring the bank management into reducing a bank's risk profile and increasing its soundness. Moreover, the literature on institutional shareholder activism underscores the role of institutional shareholders for corporate governance and monitoring (e.g., Kini, Kracaw, and Mian, 2004; Parrino, Sias, and Starks, 2003). In that respect, market discipline has traditionally been seen as a vehicle to reduce moral hazard incentives created through deposit insurance schemes, and to improve bank efficiency by exerting pressure on the lower performing banks. In addition, societal costs of supervising banks may be lower if the responsibility of oversight is shared by supervisors and market

[1] Public attention to turnovers of bank executives is not exclusively constrained to the United States. In many countries, bank executives have departed as a result of major losses triggering substantial media attention. Recent examples include IKB Bank, KfW Bank, and WestLB in Germany; UBS and Credit Suisse in Switzerland; Northern Rock, Abbey National, and HSBC in the UK; and Allied Irish Bank in Ireland, to mention just a few.

participants. (Martinez Peria and Schmukler, 2001). However, the current wave of banking sector problems illustrates rather clearly that these monitoring mechanisms have either not materialized or have not been sufficient (Flannery, 2008).

In this paper, we therefore raise the question of how market discipline actually works, and if it constitutes an intervention of an external control mechanism(Shleifer and Vishny, 1986). To do this, we isolate the different sources of market discipline and analyze their relative contribution to executive turnover.

Our analysis contributes to the discussion about market discipline in a number of ways. First, we focus on what we henceforth refer to as a new 'face' of market discipline, and model executive turnover, defined as change in either president, chairperson, CEO, CFO, or COO as a function of bank risk and bank-specific control variables. Second, we shed new light on the different channels through which market discipline operates, and disentangle discipline exerted by shareholders and debtholders from regulatory discipline. Third, we bring to bear a unique and hand-collected dataset of executive turnovers observed in small and medium sized banks in the United States between 1990 and 2007 that is subsequently merged with Call Report data. While most of the literature focuses on large and publicly listed banks (e.g., Flannery and Sorescu, 1996), our dataset offers two additional benefits: (i) it enables testing the efficacy of market discipline for smaller institutions that are not necessarily subject to scrutiny by stock and bond market participants; (ii) our sampling horizon covers nearly two decades during which considerable changes took place in the regulatory framework and in the awareness for alternative governance mechanisms. Specifically, we observe an increasing emphasis on relying on market discipline for curbing banks' risk taking behavior during the sampling period.

An exploration of the efficacy of market discipline for small and medium sized banks and of the different channels through which it operates is of immediate policy relevance reflected once more by the recent financial turmoil, which has demonstrated that regulatory monitoring alone does not ensure financial stability. Over the last decade, there has been a growing emphasis, both in the academic literature and in the regulatory policy, towards strengthening market discipline. For instance, Evanoff and Wall (2000, 2001) propose adding a mandatory subordinated debt requirement to the risk-based capital regime. The potential for market discipline created by subordinated debt has also been considered extensively in a study by the Board of Governors of the Federal Reserve (1999). Similarly, changes in regulatory and legislative frameworks have placed increasing emphasis on the role of market discipline. In particular, one of the three pillars of the Basel II capital standard is the "market discipline pillar," reflecting the idea is that if banks have to disclose more information, market participants will be able to assess banks' financial health, and trigger a change in behavior (Basel Committee on Banking Supervision, 2004).

To give a preview of our results, we find that bank managers are more likely to be removed if their bank is financially weak, and this effect is stronger for banks that are subject to debtholder discipline. These results are robust to using different measures of bank risk. Moreover, our results are insensitive to alternative definitions of what constitutes a bank executive, sampling period, and estimation method. Controlling for corporate control activity

also leaves our findings unchanged. Importantly, the effect of debtholder discipline is not only statistically significant, it can also be quantitatively large, depending on the share of subordinated debt. We find relatively little solid evidence that other forms of discipline, in particular that by shareholders and depositors, play a substantial role in influencing bank soundness for small and medium sized banks. This finding has potentially important policy implications: it suggests that while market discipline should be promoted and nurtured, so far it had only limited impact on disciplining managers in weak banks.

The structure of the paper is as follows. Section II develops our hypothesis, based on a brief synopsis of the related literature. In Section III, we explain the methodology and data set. We report results in Section IV, and offer concluding remarks in Section V.

II. RELATED LITERATURE AND HYPOTHESIS

Researchers have made great efforts to examine traditional faces of market discipline. Typically, holders of uninsured liabilities (such as subordinated debt, bonds, or holders of jumbo CDs) are assumed to have monetary incentives to monitor banks' risk return trade-offs and will therefore punish risky banks by either withdrawing funding or demanding appropriate risk premiums (e.g., Maechler and McDill, 2006). While these traditional faces of market discipline have received considerable attention in empirical work,[2] we turn our research effort towards an underresearched face of market discipline: the threat of a bank executive of being dismissed as a result of taking on too much risk.

Surprisingly, this relation has not yet been analyzed in the literature. This is remarkable, given that the role of market discipline as a means to improve the safety and soundness of the banking system has gained prominence in the literature, and it is increasingly seen as a complement to regulators' efforts to discipline banks (e.g., Flannery, 2001, 2007; Basel Committee on Banking Supervision, 2003).[3]

Finance theory proposes that any firm's outside claimants influence managers and owners to act in their interests (Flannery, 2001). This influence is exerted via the elected board, shareholder activism, and, ultimately, the market for corporate control (see Renneboog, 2000, for additional details).

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[2] A large body of literature examines risk premiums in bond markets, in particular for subordinated debt, e.g., Flannery and Sorescu (1996), Corvitz et al. (2000), Evanoff and Wall (2001), Morgan and Stiroh (2001), Hancock and Kwast (2001), and Sironi (2003). Focusing on the quantity effects of depositor discipline Goldberg and Hudgins (2002) show that failing banks experience declines in uninsured deposits prior to failure, whereas Billet et al. (1998) show that banks that received ratings downgrades substitute outflows of uninsured liabilities with insured deposits. Price and quantity effects of depositor discipline are subject of the work by Park and Peristiani (1998), and Maechler and McDill (2006). Schaeck (2008) takes a different approach in his examination of market discipline and provides evidence that banks that are relying excessively on uninsured liabilities tend to fail faster.

[3] An area of future work is to examine the extent to which the results change if the data were able to capture the banks that end up merging shortly after the reported executive turnover.

The corporate finance literature has expended great effort to analyzing the nexus between firm performance and executive turnovers. Influenced by the work of Shleifer and Vishny (1986) that suggests a critical role for large blockholders for corporate governance and monitoring firm performance, a vast body of literature has evolved on how effectively boards monitor executive behavior and how such boards hire and fire executives (for a review see, e.g., Huson, Malatesta, and Parrino, 2004). The consensus in this literature is that boards of directors can monitor firm performance and act to replace executives of poorly performing firms. Indeed, threat of dismissal for poor performance is an important motivation for executives to work towards maximizing firm value. Several studies provide evidence that firm performance (in terms of shareholders' returns) and the likelihood of executive turnover are negatively related (e.g., Coughlan and Schmidt, 1984; Warner, Watts, and Wruck, 1988; Hadlock and Lumer, 1997; Renneboog, 2000). Market discipline is usually identified as the underlying mechanism: these studies report that the association between return performance and CEO turnover is stronger for companies with outsider-dominated boards than for those with insider-dominated boards (Weisbach, 1988), and it is stronger in high competition industries (De Fond and Park, 1999). Similarly, Huson, Malatesta, and Parrino (2004) find that accounting performance measures decline prior to CEO turnover, and improve after the event. They also present evidence that turnover announcements themselves are met by a positive market response from shareholders.

Among the few articles that investigate the effect of performance on CEO turnover for banks are Barro and Barro (1990), Houston and James (1995), and Hubbard and Palia (1995). These studies analyze CEO turnover in samples of banks from the 1980s. Barro and Barro (1990) find that the probability of CEO departure depends on the CEO's age and performance, measured by stock returns filtered for peer-group returns. Their results are consistent with the corporate finance literature. Houston and James (1995) also report an inverse relationship between return performance and CEO turnover, whereas Hubbard and Palia (1995) show that executive turnover increases substantially after deregulation in the banking industry. However, they test this in a univariate setting—turnover rates before and after deregulation—and do not incorporate controls such as performance and size measures in the analysis. Recently, Webb (2008) examines the effects of the intensity of *supervisory* monitoring on turnover for CEOs of publicly-traded banks for a sample of U.S. banks from 1992 to 2004, finding that supervisory scrutiny plays a significant role for CEO turnover. Common to these studies is that they relate bank performance to CEO turnover. However, none of these articles emphasizes the effect of bank risk on executive turnover to analyze this important face of market discipline.

We argue that this face of market discipline is important as it can capture a number of different direct and indirect channels through which executives can be penalized.Specifically, the firing of an executive can be seen as an ex post manifestation of discipline for poor performance. A new executive is thought to be more likely to be able to rebuild the bank's financial condition

A variety of corporate governance mechanisms may play a role in disciplining poorly performing executives that take on too much risk. These mechanisms may be complementary or may be seen as substitutes. As part of our analysis, we try to establish the relative importance of these mechanisms.

First, shareholders, in particular large shareholders, have greater incentives to monitor managers than other stakeholders, especially small and atomistic shareholders, because large shareholders receive benefits from their monitoring activities that exceed the costs incurred from monitoring (Grossman and Hart, 1980; Shleifer and Vishny, 1986). In addition, large shareholders such as bank holding companies exercise considerable *direct* influence on corporate decisions.[4] One of those decisions is the involvement in appointing and dismissing executives (if the shareholder is represented on the board of directors).

Second, debtholders – while they do not normally acquire direct control rights – can *indirectly* influence executive behavior via two distinct avenues (Flannery, 2001): i) owners and executives understand that risk-enhancing activities impact upon price and quantity of future debt funds (e.g., Morgan and Stiroh, 2001; Maechler and McDill, 2006); ii) bondholders can affect bank behavior through *ex ante* covenants designed to constrain leverage, asset substitution possibilities, and ownership structure. Ultimately, such pressure exerted by debtholders can contribute to and facilitate the turnover of a bank executive.

Third, supervisory agencies and regulators can, under certain conditions, *directly* influence executive turnover in situations where the bank is subject to measures of prompt corrective action. In instances where a bank's capitalization falls below a predetermined threshold level, the Federal Deposit Insurance Corporation (FDIC) can require the bank to conduct a new election of the board of directors, or can force an executive turnover. These arguments suggest formulating the following hypothesis.

Hypothesis: Disciplining behavior of bank executives exerted by different stakeholders (shareholders, debtholders and supervisory agencies) is triggered by bank risk: Presidents, chairpersons, CEOs, CFOs, and COOs are replaced following increases in bank risk.

[4] There is evidence in the literature that institutional shareholders 'vote with their feet' (e.g., Parrino, Sias, and Starks, 2003) by disposing of their shareholdings rather than engaging directly into the corporate decision making process. We therefore word our statement carefully.

III. METHODOLOGY AND DATA

A. Methodology

In the presence of market discipline, an executive should face a higher risk of being replaced when her bank has a higher risk profile. We therefore shed light on the relation between managerial turnovers and bank soundness and model executive turnover as a function of banks' risk profiles and a set of control variables. As alluded to previously, we isolate the disciplining effects arising from different stakeholders and to explore how each one of them individually exerts discipline. In particular, we model debtholder discipline (i.e., discipline exerted by holders subordinated or uninsured debt), shareholder discipline (i.e., discipline exerted by major shareholders), and supervisory discipline (exerted by banks' supervisors). To this end, we model management turnover as follows

$$Turnover = f(discipline,\ bank\ \ characteristics,\ \ year\ \ dummies)$$

B. Variable Selection

In this section, we discuss the variables we use in our empirical analyses, and we also provide details about the construction of our measures of executive turnover. The choice of variables is driven by theoretical considerations and data availability.

Our dependent variable is a dummy variable "***Turnover***" that takes on the value of one if we observe a forced turnover or zero otherwise. Section III.C below contains a more detailed discussion on the definition of the forced turnover.

The explanatory variables capture the different 'faces' of market discipline, while controlling for other factors that have an influence on forced turnovers. Discipline can be exerted by the following parties: (I) debtholders, i.e. in particular depositors and holders of subordinated debt; (ii) providers of equity capital, i.e., shareholders; and (iii) regulators and supervisory agencies. To empirically isolate the different faces of market discipline, we use a variety of explanatory variables.

Debtholder Discipline

First, we focus on the role of debtholders. Flannery and Sorescu (1996) have shown that holders of subordinated debt have the ability to differentiate between sound and risky banks. Whilst debtholders cannot directly force an executive turnover, their ability to seek compensation for higher bank risk via higher yields and the possibility to refuse the rolling over of debt can discipline a bank, and can ultimately fuel the turnover of an executive. As a result, to assess the role of debtholders we use the ratio of ***Subordinate debt to total assets*** to allow for the possibility that holders of uninsured subordinate debt exert discipline. Thus, a

bank with a higher share of subordinated debt is expected to experience a higher turnover, especially when its risk profile deteriorates.

Next, we construct a variable ***core deposits to total assets*** that covers all insured depositors (i.e., customer deposits smaller than 100,000 U.S. dollars). This variable plays a dual role. According to the traditional depositor discipline literature, it captures the role of insured depositors, which are usually assumed to have less strong incentives to monitor the risk profile of their banks (e.g., Goldberg and Hudgins, 2002). According to the charter value literature (Goal, 2005), however, a high share of core deposits to total assets can help curb bank managers' risk taking and consequently decrease the likelihood of a forced turnover. The idea is that customer deposits represent a very stable and relatively cheap funding base, which greatly facilitates banks' operations. Thus, a large deposit base represents a high "charter value", in the sense that such a bank would have more to lose by engaging in excessive risk taking than other banks that rely on more expensive funding sources. Under this hypothesis, we expect a bank with a higher share of core deposits to experience higher turnover.

Shareholder Discipline

We examine several variables to capture how shareholders discipline bank managers. First, we introduce a variable ***Relative performance***, calculated as the difference between the ROA of the bank and the median ROA in the banking industry during that period. This variable is expected to show a negative sign, as shareholders are likely to be more satisfied with bank management (i.e., impose lower executive turnovers), when they earn a relatively higher level of dividends. This is consistent with the corporate finance literature, which suggests that profits are inversely related to executive turnovers (Hadlock and Lumer, 1997; De Fond and Park, 1999).

We also construct a dummy, ***Bank Holding Company Dummy (BHC Dummy)*** that takes on the value one if the bank is a member of a bank holding company. The idea is that a bank that is part of a bank holding company may be subject to more complex risk management and stricter monitoring, either at the subsidiary or at the group level. Consequently, we anticipate a bank holding company to have a higher sensitivity to risk, so that the BHC Dummy is likely to enter with a positive coefficient.

Finally, we also investigate to which extent executive turnovers are attributable to bank failure. For this, we generate a dummy, ***Prefailure Dummy (PreFD)***, that takes on the value of one if the turnover occurs within eight quarters prior to the failure of the bank or zero otherwise. A positive sign for the coefficient indicates weaker bank discipline, in the sense that executive turnovers would occur mostly once it is no longer possible to redress a bank's risk profile.

Supervisory Discipline

To capture supervisory discipline, we use a ***Supervisory Intervention Dummy (SID)***. We construct the variable based on the prompt corrective action (PCA) framework applied by the U.S. supervisory authorities (see, e.g., Benton and Kaufman, 1994). According to the PCA framework, if a bank's capitalization breaches a certain threshold, the supervisory authority will require the bank to hold a new election for the board of directors, or dismiss directors or senior executive and demand their replacement by new officers. Our regulatory intervention dummy takes on the value one if the banks total equity ratio falls below 6 percent.[5] This variable helps ascertain if the executive turnover is due to regulatory or supervisory pressure rather than discipline exerted by the market. A bank under supervisory scrutiny is expected to experience a higher managerial turnover.

Bank Soundness Measures

The literature offers a range of approaches to measuring bank soundness. We use two of these measures in our analysis: Z-scores and probabilities of default.

First, we calculate a ***Z-score***, which is a popular measure of bank soundness because it combines banks' buffers (capital and profits) with the risks they face (measured by the standard deviation of returns) in a way that is grounded in theory. Put simply, it measures how many standard deviations a bank is away from exhausting its capital base (see Appendix II for a detailed exposition). A higher Z-score therefore implies a lower probability of insolvency, providing a more direct measure of banks' soundness than, for example, simple bank leverage measures. We calculate the Z-score as

$$Z = \frac{ROA + E/A}{\sigma ROA} \quad ,$$

where ROA is the bank's return on assets, E/A denotes its equity to asset ratio and σROA is the standard deviation of return on assets computed for a three-year rolling time window. We use a three-year rolling time window for the σROA to allow for sufficient variation in the denominator of the Z-score. This approach avoids that the Z-scores are exclusively driven by variation in the levels of capital and profitability.

Second, we calculate a ***Probability of Default (PD)*** in the spirit of Park and Peristiani (2007). To this end, we use the population of all commercial banks operating in the U.S. during the period 1990 and 2007, and estimate a binary probit model where the dependent variable takes on the value one if the bank failed or zero otherwise. The vector of explanatory variables follows the CAMEL taxonomy. Capitalization is measured as the ratio of equity

[5] A bank is classified as significantly undercapitalized when the Total risk-based capital is below 6 percent, Tier 1 risk-based ratio falls below 4 percent, and Tier 1 leverage-ratio is below 4 percent. However, since the Call Report data do not contain information about Total risk-based capital, Tier 1 risk-based capital, and Tier 1 leverage ratio prior to 2001, we approximate the threshold level by constructing a dummy variable that takes on the value 1 if the banks' total capital ratio falls below 6 percent. The correlation between the total capital ratio and total risk-based capital is 0.91; the correlation between the Tier 1 risk-based ratio and the Tier 1 leverage-ratio is 0.78.

capital to total assets. Asset quality is approximated by charge-offs, C&I loans, and real estate loans, all scaled by total assets. We capture Management quality by non-interest expense ratio, and earnings by return on assets. Liquidity is measured by the levels of government bonds and liquid assets, both scaled by total assets. Total assets (log) is included to account for the too-big-to-fail paradigm. We account for varying conditions across time and local macroeconomic conditions, and also include a set of time dummies.

The estimated coefficients are generally significant and exhibit the anticipated sign. The PD estimates are accurate and significantly correlated with the actual failures of U.S. banks during the sample period (Appendix II provides details for the PD estimation).[6]

Control Variable

The corporate finance literature suggests that larger firms experience higher turnover rates, reflecting promotion and retirement policies that reduce tenures in executive positions (Warner, Watts, and Wruck, 1988). To take this argument into account, we control for ***Size***, measured by total assets (log). We anticipate bank size to exhibit a negative sign in the regressions. In our regressions, we also include a set of year dummies to account for macroeconomic differences during the economic cycle.

C. Dataset

Bank Data and Sample Coverage

We obtain bank data from the Quarterly Report of Condition and Income (Call Report). Summary statistics for the variables are provided in Table 1 below. Given that we aim to investigate the nexus between bank soundness and managerial turnover, our focus is on commercial banks, and we do not examine bank holding companies (BHCs), because we want to avoid possible contagion of the results due to non-bank activities in BHCs. The banks in our sample can be classified as small and medium sized institutions; none of them is listed on a stock exchange. As a result, exploiting this dataset helps shed additional light into the question as to whether market discipline can effectively limit risk taking behavior of those types of institutions.

Managerial Turnover

We use the LEXIS/NEXIS database, and employ a variety of key-word searches to differentiate between forced and voluntary executive turnovers in U.S. banks in 1990–2007.[7]

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[6] We also consider the effect of bank risk on management turnover using the variable ***Loan Loss Provisions to Total Assets.*** This is a widely used proxy for bank risk in other studies (e.g., Nier and Baumann, 2006). However, this variable is a relatively weak measure of risk as a high share of loan loss provisions can either account for sound bank management (in case bad loans are provisioned promptly and generously) or weak bank management (in case bad loans reflect a particularly low asset quality). In our regressions, this variable remains insignificant in all specifications and we therefore do not report the results.

[7] We use the following keywords: management change, forced resignation, turnover, separation, CEO ousted, early retirement, step-down, mandatory/voluntary separation, fired, made redundant, departure, management

The year 1990 marks a good starting point, because we observe thereafter a period of major strengthening of regulatory powers for dealing with ailing banks (e.g., Federal Deposit Insurance Corporation Improvement Act, 1991).

Our initial search yields 661 articles from different sources, including well known international newspapers such as the Wall Street Journal, as well as regional U.S. newspapers and business journals.[8] To identify whether the bank is a subsidiary, we access the official website of the bank and obtain company profiles from Reuters, Business Journal, Manta, and Goliath. We ascertain the executive's departure date and take the exact date of the turnover when it is reported. In case the departure date is not reported in the media, we take the date of the newspaper as departure date.

We adopt a broad definition of the term bank 'executive', and define any individual that holds the position of president, chairperson, chief executive officer (CEO), chief financial officer (COO), or chief operating officer (COO) as executive. Given that the main objective in our study is to analyze the relation between the channels of market discipline and risk of the bank, we exclude all turnovers that occur in banking arms and divisions of the bank. We also do not differentiate between different types of managerial turnover (e.g., a CEO versus a COO turnover). To identify our sample of executive turnovers, we follow the corporate finance literature (e.g., Parrino, Sais, and Starks, 2003), and establish a set of criteria that need be met for an executive turnover to be classified as forced.

We classify a turnover as "forced" if the executive is reported to be fired, forced to step down or departed due to undisclosed policy differences. All remaining executive turnovers are classified as voluntary, unless they meet at least one of the following criteria:

- the departure is announced with the reason not being death, poor health, or acceptance of a position either elsewhere or within the bank,

- the executive is reported to retire but does not announce the retirement at least six months prior to succession,

- the executive turnover is subject to takeover pressure. This reflects that the turnover surrounding a merger is more likely to be related to soundness of the bank (e.g., Martin and McConnell, 1991). A turnover is furthermore classified as subject to takeover pressure if during this period there was a proxy fight, takeover bid, or rumor of a bid involving the bank. If the bank adopted a poison pill or other takeover defense, if there

succession, executive change and CEO tenure. To assess the sensitivity of our keyword search, we also replicate the search using the NewsPlus/Factiva database, which yields very similar results (not reported).

[8] A comprehensive list of all U.S. newspapers and trade and business journals we use for the analysis is available in the Data Appendix.

was a board shake-up, or if some other similar event occurred, the turnover is also classified as forced due to takeover pressure (Huson, Malatesta, and Parrino, 2004).[9]

- in case of non-informative reasons, forced turnover due to disciplining actions or due to company policy disputes is assumed.

Imposing these criteria yields in total 90 executive turnovers. In Appendix A, Panel A, we present the list of banks that experience executive turnovers and the types of turnovers in the sample. The number of presidential turnovers dominates the sample with 48 turnovers, followed by CEO turnovers (27), and chairpersons (8). Newspapers devote considerably less attention to turnovers of CFOs (2) and COOs (5).[10] Panel B illustrates a bimodal distribution of our turnover data. For the period 1990-1998 we observe 48 executive turnovers, with a peak in 1994, and another peak in 2005. During 1990 and 2007, we observe another 42 turnovers in total. Moreover, the data also indicate a slightly higher number of turnovers during the early years of the sampling period. This is likely to be influenced by the banking turmoil in the late 1980s and early 1990s. In recent years, we observe another increase in the number of forced turnovers, reflecting on the sub-prime crisis starting in 2007.

Matching Procedure

In instances, where an individual holds more than one role, e.g., CEO and chairman (also referred to as 'duality') and if we observe a departure, we count this as one turnover in our sample for the empirical implementation. This procedure reduces our initial set of 90 turnovers to 65 forced turnovers. Consequently, it would not be reasonable to compare this group to all other banks operating in the United States, given the heterogeneity across the different size groups of banks. Furthermore, there are good reasons to believe that firm size affects both managerial incentives and performance (e.g., Hubbard and Palia, 1995), underlining the importance of differentiating among the different types of banks in terms of size. To mitigate such problems, we follow a two-step approach when we match our turnover data with Call Report data.

In a first step, we access the National Information Center website,[11] to match the banks for which we observe executive turnover with Call Report data, using location and name checks to facilitate our matching procedure. This procedure allows us to match the 65 executive turnovers with balance sheet and income statement data for the banks during the period 1990–2007.

In a second step, we construct our estimation sample to find similar banks in which no turnover is observed. To this end, we use a matching method based on bank size and

[9] Takeover pressure may be observed for some good and vibrant banks and may not necessarily be a reflection of market discipline but rather market appetite. We adjust for this by controlling for the bank's soundness.

[10] As a consequence, we perform one robustness test and remove those turnovers where the turnover is observed exclusively for top executives, defined as either president, chairperson, or CEO.

[11] http://www.ffiec.gov/nicpubweb/nicweb/SearchForm.aspx.

location. Our size criterion ensures that we compare banks with similar operations in terms of scale and business model. Location is used as an additional matching criterion because the banks are primarily small and medium-sized institutions that are likely to be affected by local macroeconomic conditions in a similar manner.

Specifically, for each bank for which we observe a turnover, we identify at least one matched bank that is located in the same state and is of similar size. We measure size by total assets, and consider a matching bank as similar if its total assets are between 80 and 120 percent of the bank for which we observe a turnover. If several banks qualify as matches based on the two criteria, we restrict the number of matches to the four banks that are closest in terms of their asset size.[12] We drop six banks from our original turnover sample for which we do not find a matching bank. Our final sample consists of 59 banks with turnovers (henceforth referred to as the "turnover" group) and a group of 215 matched banks (henceforth referred to as the "matched" group).

In Table 1, we present summary statistics for the banks in the turnover and matched groups. We use t-tests to compare differences in the means of the key characteristics in the two samples, and utilize Wilcox on tests to ascertain whether the two samples are independent and come from populations with the same distribution. As expected, both the t-tests and Wilcox on tests confirm that there are no significant size differences between the two samples at conventional levels of significance.

[TABLE 1]

However, significant differences exist in terms of the banks' risk profiles. All our measures of bank risk, Z-score, and probability of default (PD), indicate that banks that have their senior managers replaced are substantially riskier than the institutions in the matched control group. For instance, banks that have their managers fired are on average less than 43 standard deviations away from exhausting their capital, whereas banks in the matched control group are on average 79 standard deviations away from depleting their capital. Moreover, our "pre-failure" dummy underscores that banks that experience executive turnovers are also more likely to fail subsequently.

The comparisons in Table 1 yield several additional insights. Banks with forced turnovers exhibit on average negative returns on assets, and also experience negative relative returns on assets. These findings are aligned with the results on executive turnover in the corporate finance literature (e.g., Warner, Watts, and Wruck, 1988), and recent work by Webb (2008) for financial institutions. Finally, the negative sign for the variable Large deposits/Total assets also suggests that turnover banks are significantly more reliant on uninsured term deposits. This result may not only reflect a more aggressive funding strategy by the managers that are subsequently fired, but also provides some suggestive evidence for the presence of depositor discipline, if managers need to increase yields by so much to attract large deposits

[12] Using the LEXIS/NEXIS database, we verify that no executive turnover is reported for the banks in the matched group.

that it becomes questionable and leads to their firings. As such, observing a forced turnover of a bank executive may constitute a new manifestation of market discipline.

In sum, a preliminary inspection based on differences between the two samples of turnover banks and the matched control group highlights considerable differences in terms of risk profiles, and already suggests a relation between bank risk and executive turnovers. We turn to a more detailed multivariate analysis below.

IV. RESULTS

We present the main results in Table 2. Panel A shows the results from the binary probit regressions of management turnover that use Z-scores as a measure of bank soundness. Panel B shows the results of the same models with probability of default as a measure of bank soundness.

[TABLE 2]

Market discipline and executive turnover

The basic result reflected in Panels A and B is that bank managers are more likely to get fired in banks that are financially weak. In other words, the probability of forced executive turnover is significantly higher in banks that have lower Z-scores (or higher probability of default). This finding is rather robust across the various specifications, and lends support to our hypothesis that different stakeholders can discipline bank managers. We interpret our result to constitute novel evidence for a thus far unnoticed 'face' of market discipline – the executive's exposure to the risk of being forced out of her job. Moreover, our finding lends some more support to the idea that market discipline works, at least to some extent, also for small and medium sized banks that tend to be less subject to public scrutiny than their large and listed counterparts.

A number of features stand out. Panel A in Table 2 suggests that the elasticity of forced turnovers with respect to bank soundness (measured by Z-scores) is higher for large banks (indicated by the positive sign of the log of total assets multiplied by the Z-score). However, this result is not corroborated when bank soundness is measured by the probability of default, as indicated in Panel B. Similarly, banks with a higher share of core deposits to total assets tend to have a higher turnover and turnover becomes even higher when bank soundness deteriorates (Table 2, Panel A). While this result lends some support to the charter value hypothesis, we cannot confirm these findings when we use the alternative measure of bank soundness in Panel B.

Our results provide another important insight: Debtholder discipline plays a significant role for penalizing bank executives for engaging in risky ventures. Specifically, the positive signs for the coefficient for subordinated debt in Columns (1) and (3) in Table 2 underscore that a bank with a higher share of subordinated debt is more likely to experience executive turnover. Furthermore, if this bank becomes weaker (i.e., its Z-score declines, or its probability of default increases), the probability of observing executive turnover increases

even more significantly as reflected by the negative sign of the interaction term in Columns (2) and (4) in Table 2.

Economic significance

To illustrate the economic significance of the observed impact of debtholder discipline, let us compare two hypothetical banks with the same characteristics as the full sample average, except for the ratio of subordinated debt to total assets. Specifically, let that ratio be 0 (the sample minimum) in the first bank and 0.021 (the sample maximum, see Table 1) in the second bank. Now let us assume that both banks' Z-scores decline by the same amount. All else equal, the probability of turnover increases in both banks (the negative coefficient for the Z-score means that if a bank becomes less sound, the probability of turnover increases). However, the increase in the probability of management turnover is much larger in the second bank than in the first bank; specifically, it is about *5.8 times larger*.[13] That difference is likely to be economically significant (depending of course on the extent of the assumed decline in the Z-score).

The variables that aim to isolate the other forms of discipline, namely shareholder discipline and depositor discipline (approximated by the BHC dummy, and by core deposits to total deposits ratio, respectively, and the interactions of these variables with the Z-score and the probability of default) do not consistently assume significance at conventional levels. Only the BHC dummy has a borderline significant impact turnover when interacted with the probability of default, indicating that a bank affiliated with a BHC tends to have a higher executive turnover rate, especially when their probability of default is rising (Column (4), Panel B in Table 2).

The supervisory dummy, and its respective interaction terms remain insignificant across all specifications. Supervisory discipline does not appear to be associated with executive turnover. Our findings contrast with the results presented by Webb (2008) who had access to supervisory data for publicly listed banks. The diverging findings suggest that supervisory discipline works more effectively for banks that are subject to greater scrutiny by the public. Or, in other words, supervisory discipline is complemented more by market discipline if the institution is a listed bank.

We conclude that the role of other forms of market discipline and also supervisory discipline (as defined by the PCA framework) has been limited at best. Also, bank size (approximated by the log of total assets) does not have a significant impact on forced turnovers. This latter result is in line with our expectations because our matching procedure has captured possibly arising effects from bank size already.

[13] To verify this, note that in a logistic regression, a ratio of the coefficient provides a measure of the relative changes in the probabilities, namely $\frac{\beta_j}{\beta_k} = \frac{\partial E(y_i|x_i,\beta_i)/\partial x_{ij}}{\partial E(y_i|x_i,\beta_i)/\partial x_{ik}}$, where the βs, ys, and xs are the coefficients, the binary dependent variable, and the explanatory variables, respectively. In the assumed case, the first bank has no subordinated debt (this is the sample minimum), which "shuts off" the impact of debtholder discipline makes the relative comparison straightforward.

[TABLE 3]

In Tables 3, we present separate estimations of the models that we refer to as "debtholder discipline model," "shareholder discipline model," and "supervisory discipline model", respectively. These estimates confirm the results of the "nested model" from Table 2. In particular, the debtholder discipline model indicates that the intensity of debtholder discipline, approximated by the share of subordinated debt in total assets, has a statistically significant impact on forced management turnover.

In the shareholder model, we additionally incorporate the variable relative profits, defined as the difference of the return on assets of the individual bank relative to all banks in the respective year, to account for shareholders' interest in exerting discipline when the bank fares poorly relative to its peers. Relative profits enter in most regressions negatively and significantly, indicating that a relative underperformance is more likely to result in executive turnover. We obtain largely similar results when we define relative profits based on return on equity.[14] These results are in line with the corporate finance literature.

Moreover, the results from the shareholder discipline model suggest that bank holding company affiliation increases the frequency of executive turnover. However, we also find that being owned by a bank holding company does not make executive turnover more sensitive to bank soundness. The shareholder discipline model also underscores that banks with lower relative profitability are more likely to face forced executive turnover, a finding that is in line with the corporate literature. This result is observed throughout the shareholder model. Interestingly, the interaction of the profits with the probability of default, which has not been included in the traditional corporate finance literature, is significant at the one percent level, suggesting that banks with a rising risk profile are more likely to see their management fired, especially when this bank has been generating high profits. This is somewhat counter-intuitive as it is generally believed that managers are allowed to take higher risk as long as they compensate for it for through higher returns. Our result, however, seems to indicate that for our sample period shareholders were not willing to jeopardize the soundness of their bank, especially when high profits may have given them the financial means to fire comfortably their current bank management and hire a new one.

The supervisory discipline model is consistent with the other estimates in the sense that the proxies for bank soundness (Z-score and probability of default) play an important role in explaining forced turnovers. However, the proxy for supervisory discipline (SI dummy) does not assume significance. One explanation may be that some of the supervisory action takes place independently from the PCA trigger points. If that is the case, it is possible that to some extent, supervisory discipline is captured in the baseline relationship between the Z-score and probability of forced turnover. Since supervisory visits are confidential, we cannot evaluate this mechanism in greater detail.

[14] These regressions are not reported here to conserve space, but can be obtained upon request.

Robustness checks

In this section, we present robustness tests, using alternative definitions of executives, alternative estimation methods, and alternative sample selections. In another test, we extend our analysis and additionally consider corporate control activity surrounding the departure of the bank executive in a time window of *t+1* and *t-1* year. For brevity, we constrain our subsequent discussion to the two measures of bank risk.

[TABLE 4]

Panel A and B in Table 4 again differentiate in the respective measure of bank risk. In Column (1) and (2), we exclusively focus on top executives, defined as either president, chairperson, or CEO, and remove observations when the turnover is observed for individuals in the role of CFO and COO. Our results remain largely unaffected, and we conclude that market discipline is focused on the top executives in a bank.

Columns (3) and (4) use ordered probit models rather than binomial probit models. We observe a maximum of turnovers of three positions simultaneously, and construct the nodes by summing across the different roles of the executives, i.e., president, chairperson, CEO, CFO, and COO. We consider an instance in which three departures are observed simultaneously as the strongest manifestation of market discipline, followed by two departures, and so on. Thus, the rationale underlying our approach is that the disciplining effect is most prominently illustrated if three executives are dismissed. The findings in Table 4, Columns (3) and (4), Panel A fully reinforce our conjecture, and the Z-Score as well as its interactions with the other variables again enter with the expected signs at conventional levels of significance. The findings in Panel B, although somewhat weaker in terms of statistical significance, also lend some support to our hypothesis.

In Columns (5) and (6) we reflect on the large body of literature that underscores that executive turnovers are frequently related to corporate control activity (e.g., Denis and Serano, 1996; Denis, Denis, and Sarin, 1997; Kini, Kracaw, and Mian, 2004; Harford and Li, 2007). Thus, observing an executive turnover may reflect an underlying relation arising from interaction between external control activity and internal monitoring rather than a disciplining action attributable exclusively to excessive bank risk. The intuition is that executive turnover serves as a signal for takeover bids, since takeovers occur also to replace managers that are not maximizing shareholder wealth (e.g., Jensen, 1988).[15] Using the National Information Center's website facility to retrieve information about the bank's history, we therefore investigate if the banks in our sample were involved in M&A activities during a one year time window surrounding the executive's departure date as either target or acquirer, and remove these institutions from our sample. This test reassures that our findings are not driven by corporate control activity but are attributable to bank risk. In Panel A, our previous findings are again confirmed, and Panel B, although the evidence is somewhat less

[15] Note that the corporate takeover market can be considered as a "court of last resort" in the sense that it constitutes a source of external discipline that is invoked in instances when internal control mechanisms are relatively weak or ineffective (Jensen, 1988).

compelling, also reaffirms that bank risk is indeed the driving force behind executive turnover. In unreported regressions, we further differentiated between banks being either target or acquirer, but the findings are not affected.

Whether a bank is owned by a BHC or not has an impact on its operations. Among other things, the parent determines the bank's strategy and has a major role in replacing the bank CEO. It is possible that these differences have a more profound impact that can be captured by the BHC dummy variable that is already included in our regressions. To test for the possibility that the executive turnover mechanism in BHC-owned banks is fundamentally different from that in other banks, we re-run our regressions for a sample that includes only banks that are only BHC members. The results (available upon request) are similar to the full sample results, with the key relationships between risk and executive turnover having the same sign and similar size and significance.

To account for the increased awareness of market discipline in the later parts of our sampling period, the bimodal distribution of executive turnovers, and changes in governance regimes, we split our sample into sub-samples. Specifically, we re-estimate the regressions separately for 1990–1998 and 1999–2007. The findings remain again unaffected, and we therefore do not report them.[16]

In sum, our findings remain unaffected by the definition of bank executive, type of estimation method, and sample size, and they are also robust to controlling for executive turnovers that are related to M&A activities.

V. CONCLUSIONS

We concentrate on an important face of market discipline that has not yet been adequately addressed in the literature. Specifically, we investigate the relation between executive turnover and bank soundness. Other distinctive features of our analysis are the isolation of the different channels through which market discipline can operate, and the focus on a sample of small and medium sized banks that are not subject to close scrutiny by market participants covering nearly two decades during which considerable changes in the regulatory environment took place .

Using a unique hand-collected dataset of executive turnovers that sheds light into the efficacy of market discipline for small and medium sized banks in the United States between 1990 and 2007, we analyze the role of debtholders, shareholders, and regulators in bringing about management changes. Our dataset offers the additional benefit that it allows us to take a closer look at the efficacy of market discipline for banks that are not publicly listed. To examine the different channels of market discipline, we combine our hand-collected dataset for executive turnovers with bank-specific data from Call Reports and use a matching procedure based on bank size and location to focus on banks only that exhibit similar characteristics in terms of business model and macroeconomic environment.

[16] The results from the additional sensitivity checks can be obtained from the authors upon request.

Our results constitute novel evidence that bank managers are more likely to be removed if their bank is financially weak, and this effect is stronger for banks that are subject to discipline exerted by holders of subordinated debt. This effect is robust to using alternative measures of bank risk, alternative definitions of executives, alternative sampling periods, and alternative estimation methods. The findings also obtain after adjusting our regressions for corporate control activity, indicating that executive turnovers are driven by bank risk rather than M&A activities. However, we find relatively little convincing evidence that other forms of market discipline, in particular discipline exerted by shareholders and depositors, play a significant role. The relatively small effect of shareholder discipline raises the question as to the efficacy of the monitoring abilities of bank holding companies and the associated corporate governance arrangements. In that sense, the prevailing corporate governance regime does not appear to be appropriate for small and medium sized institutions. Likewise, the small impact of regulatory discipline indicates that supervisory interventions seem insufficient to penalize poorly performing bank executives.

We interpret our findings as suggestive evidence that underlines the relative importance of debtholder discipline relative to other forms of market discipline. Thus, our results suggest that the behavior of debtholders may not only deserve more regulatory attention in the future but also can be used to further complement and support discipline exercised by regulatory authorities.

One question that our analysis (as well as most of the market discipline literature) does not answer is whether the observed levels of market discipline are sufficient or not. The current financial crisis suggests that disciplining effects left much to be desired. Nevertheless, our analysis sheds some light on which channels may be most effective as a means for strengthening market discipline.

DATA APPENDIX. DATA SOURCES FOR EXECUTIVE TURNOVER

Newspaper sources used: The Financial Times, New York Times, Wall Street Journal, American Banker, Forbes, BBC News, BusinessWeek, SEC Info, Investor's Business Daily, Business Wire, The Daily Record (Baltimore, Maryland), Orange County Register (California), The Herald (Rock Hill, South Carolina), Herald Tribune, Sarasota Herald-Tribune (Florida), Charlotte Observer (North Carolina), Columbus Dispatch, Virginia Lawyers Weekly, The Associated Press, Bangor Daily News (Maine), Arkansas Business, Patriot Ledger (Quincy, MA), Baltimore Business Journal, Sacramento Business Journal (California), Philadelphia Business Journal, The Philadelphia Inquirer, Birmingham News (Alabama), Los Angeles Times, Charleston Gazette (West Virginia), Florida Times-Union (Jacksonville, FL), Milwaukee Journal Sentinel (Wisconsin), Wisconsin State Journal (Madison, WI), Miami Herald, The Seattle Times, Plain Dealer (Cleveland, Ohio), Star Tribune (Minneapolis, MN), The Post-Standard (Syracuse, NY), Knight-Ridder/Tribune Business News, The Salina Journal (Kansas), The Providence Journal (Rhode Island), Kansas City Star, The Press Enterprise Co, The Indianapolis Star, New Hampshire Business Review, Black Enterprise, Business Services Industry, Crain's Detroit Business, Kansas City Business Journal, Dallas Business Journal, Hartford Courant (Connecticut), Buffalo News (New York), Washington Post, Fairfield County Business Journal, San Francisco Business Times, Rochester Business Journal, St. Petersburg Times (Florida), United Press International, The Atlanta Journal and Constitution, National Mortgage News, The Times Union (Albany, NY), Intelligencer Journal, St. Louis Post-Dispatch (Missouri), New Haven Register, Arkansas Democrat-Gazette (Little Rock), The Honolulu Advertiser (Honolulu, HI), The Record (Bergen County, NJ), The Post-Standard (Syracuse, NY), Omaha World Herald (Nebraska), Times-Picayune (New Orleans, LA), Des Moines Register, The Washington Post and Bnet, The Commercial Appeal (Memphis, TN), Hawaii Inc., PR Newswire, The Augusta Chronicle (Georgia), News & Record (Greensboro, NC), St Louis Business Journal, The Lexington Herald Leader (Kentucky), The Business Journal (Tampa Bay Florida), East Bay Business Times (California), Columbus Business First (Ohio), The Business Review (Albany New York), Denver Business Journal, Las Vegas Review-Journal, The State (Columbia, SC), The Houston Chronicle (Texas), Lancaster New Era (Lancaster, PA.), El Paso Times (El Paso, Texas), Providence Journal-Bulletin (Rhode Island), St. Louis Post-Dispatch (Missouri), Rocky Mountain News (Denver, Colorado), Atlanta Business Chronicle, The Wichita Eagle, The Tennessean, Winston-Salem Journal, Florida Trend, The Seattle Post-Intelligencer, La Crosse Tribune (Wisconsin), The Capital Times (Madison, WI), The Journal News, Morning Call (Allentown, PA), The Associated Press State & Local Wire, The Boston Herald, Columbus Ledger-Enquirer, The Baltimore Sun, The Olympian (Olympia, Washington), Dayton Daily News (Ohio), The Bradenton Herald, Vermont Business Magazine, The Boston Globe, Knoxville News-Sentinel (Tennessee), Business First-Buffalo, Chicago Tribune, Seattleite and Puget Sound Business Journal, San Diego Daily Transcript, The Herald-Sun - Durham, North Carolina, The Dallas Morning News, Cox News Service, The Pantograph (Bloomington, IL), Business for Central New Jersey, The Business Journal-San Jose ,Facts on File World News Digest, Citigroup Inc.CNNMoney.com

APPENDIX I. TURNOVERS IN SMALL AND MEDIUM SIZED U.S. BANKS 1990-2007

Panel A: Banks, timing and type of turnover

Turnover Date	*Name*	*State*	*President*	*CEO*	*Chairperson*	*COO*	*CFO*
February 1990	Independence Bank of New Jersey	NJ	■				
December 1990	Madison National Bank	DC	■		■		
January 1991	Johnson County Bank	TN	■				
June 1991	Cass Bank & Trust	MO	■				
June 1991	Pacific Western Bank	CA	■				
May 1991	Chestnut Hill National Bank	PA		■			
December 1991	Truckee River Bank	CA	■				
January 1992	Great Country Bank	CT	■	■			
May 1992	First National Bank of Marin	CA	■				
May 1992	Clayco State Bank	MO	■				
July 1992	First National Bank	NY	■				
September 1992	Amity Bank	CT			■		
December 1992	First Bank Of Philadelphia	PA		■			
May 1993	Connecticut Bank Of Commerce	CT		■		■	
June 1993	Cicero Bank	NY	■				
July 1993	Connecticut Bank Of Commerce	CT					■
October 1993	Connecticut Bank Of Commerce	CT		■			
October 1993	Buffalo Bank	WV	■		■		
March 1994	Covenant Bank For Savings	NJ	■				
June 1994	First Commercial Bank	CA	■	■			
May 1994	Elverson National Bank	PA	■				
September 1994	Cupertino National Bank & Trust	CA	■			■	
August 1994	Greensboro National Bank	NC	■				
October 1994	Great Country Bank	CT	■	■			
January 1995	Bank of South Windsor	CT	■				
February 1995	First Commercial Bank Of Philadelphia	PA		■			
May 1995	Central Bank of Tampa	FL	■				
May 1995	Corporate Bank	CA	■	■			■
April 1995	United Missouri Bank USA	DE	■				
December 1995	Border Trust	ME				■	
April 1996	Hudson City Savings Institution	NY	■	■			
September 1996	Mercantile Bank Of Arizona	AR	■	■	■		
September 1997	Mercantile-Safe Deposit & Trust	MD	■			■	
November 1997	Commerce Exchange Bank	OH		■	■		
January 1999	Park Bank	WI	■				
January 1999	Peoples National Bank of Commerce	FL	■				
August 1999	Franklin Bank National	MI	■				
September 1999	First Internet Bank	IN	■				
December 1999	American Bank	FL	■				
April 2000	South Carolina Community Bank	SC		■			
July 2000	Pennsylvania State Bank	PA	■	■			
January 2001	Summit National Bank	TX	■				
May 2001	Mutual Community Savings Bank	NC	■	■			
November 2001	Redlands Centennial Bank	CA	■	■			
February 2002	Commerce Bank Harrisburg	PA		■			
May 2002	Clover Leaf Bank	IL	■				
July 2002	Rock Hill Bank & Trust	SC	■			■	
September 2002	Bankannapolis	MD		■			
October 2002	Delaware County Bank & Trust	OH	■	■			
March 2003	Gold Bank	KS	■	■			
August 2003	Glenview State Bank	IL	■				
January 2005	Provident Bank Of Maryland	MD	■	■			
February 2005	Venture Bank	WA		■	■		
June 2005	Conway National Bank	SC	■		■		
August 2005	M Bank	MI	■	■			
December 2005	First FNCL Bank	TX	■				
June 2006	Douglass National Bank	MO	■		■		
September 2006	Harleysville National Bank & Trust	PA	■	■			
March 2007	Parkway Bank	AR	■				
April 2007	State Bank of Long Island	NY		■			
April 2007	Landmark Community Bank	TN	■	■			
August 2007	Pinnacle Bank	AR	■	■			

Panel B: Distribution of executive turnovers 1990-2007	
Year	***Number of turnovers***
1990	3
1991	5
1992	7
1993	7
1994	9
1995	8
1996	5
1997	4
1998	0
1999	5
2000	3
2001	5
2002	7
2003	3
2004	0
2005	9
2006	4
2007	6

APPENDIX II. MEASURING BANK SOUNDNESS

In this appendix, we provide additional details about the two measures of bank soundness used in our study.

Z-score

The Z-score is a frequently used measure of bank soundness (e.g., Mercieca et al. 2007; Stiroh, 2004a, 2004b; Demirgüç-Kunt et al., 2008). A number of reasons exist for the Z-score's popularity as a measure of bank soundness.

First, it can be shown that the Z-score is inversely related to the probability of a financial institution's insolvency, i.e. the probability that the value of its assets falls below the value of its debt. The probability of default is given by $p(ROA < E/A) = \int_{-\infty}^{E/A} \phi(ROA)dROA$. If ROA is normally distributed, then $p(ROA < E/A) = \int_{-\infty}^{z} N(0,1)\,dROA$, where z is the Z-score. In other words, if returns are normally distributed, the Z-score measures the number of standard deviations a return realization has to fall in order to deplete equity. Even if μ is not normally distributed, z is the lower bound on the probability of default (by Tchebycheff inequality).

Second, an important practical advantage of the Z-score is that it can be computed in an easy and transparent fashion for all banks in the sample as only accounting information is needed (in contrast, market-based measures such as distance to default require markets that are non-existent or illiquid for many of the banks in our sample).

Third, empirical studies confirm that the Z-score is indeed a useful measure of bank soundness. For example, Čihák (2007), using a sample of 29 countries, including 12 with systemic banking crises, finds that banks in these crises are characterized by significantly lower Z-scores than other banks.

Fourth, the Z-score, although it not explicitly incorporates an institution's exposure to individual products such as CDOs, CDs, or subprime mortgages, ultimately reflects such exposures in case these risks come to bite and translate into either lower returns, lower capitalization, or higher standard deviations of returns.

Probability of Default

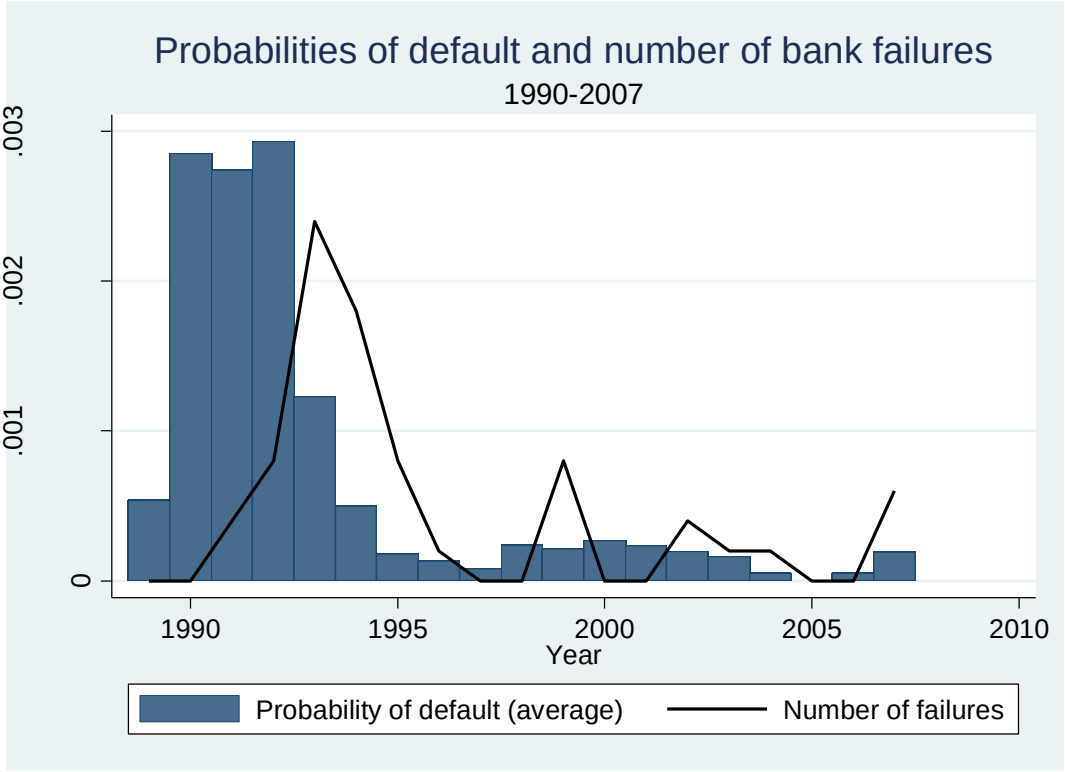
As an alternative to the z-score, we calculate the probability of default (PD), using a probit model similarly to the approach put forward by Park and Peristiani (2007). We use annual data for t-1 to calculate the PDs for year *t*. For this estimation, we draw upon the entire

population of commercial banks in the United States in 1990–2007, our failure information is obtained from the FDIC bank failure database.[17]

Our coefficients are generally significant and exhibit the anticipated sign (not shown). The PD estimates are accurate and significantly correlated with the actual failures of U.S. banks during our sampling period. The correlation coefficient is 0.1031 and is significant at the one percent level.

A plot over time of the average probability of default per year also indicates a considerable decline towards the end of our sampling period, consistent with the concomitant decline in the number of failures. Indeed, the regulatory responses to the banking turmoil in the late 1980s and early 1990s have led banks to operate at significantly lower levels of risk, culminating in no single bank failure in 2005.

Figure 1: Probabilities of default (average) and number of bank failures



[17] We follow the FDIC's bank failure database and classify failure as having occurred if any one of the following events took place: assisted merger, purchase and assumption, transfer and assumption of insured deposits, re-privatization, closing and reopening, or depositor payoff. We also classify a bank as failed if it was subject to the management consignment programme.

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Table 1. Summary statistics, differences of means and bank characteristics

	Treatment group: Banks w/o managerial turnovers *(TURN = 0)*				Matching group: Banks w managerial turnovers *(TURN =1)*				Significance	
Variable	**N**	**Mean**	**Min**	**Max**	**N**	**Mean**	**Min**	**Max**	**Mean**	**Wilcoxon**
Matching variable										
Total assets	215	385907.600	16155.000	7417242.000	59	509640.700	16215.000	6163741.000	-1.003	-0.619
Risk variables										
Probability of default (PD)	75	0.002	0.000	0.019	19	0.045	0.000	0.380	-3.507***	-2.151**
Z-score	215	79.308	-1.947	431.980	59	42.606	-6.908	195.838	4.411***	4.916***
Bank characteristics										
Subordinated debt/Total assets	215	0.000	0.000	0.021	59	0.001	0.000	0.019	-0.037	-0.972
Fed funds/Total assets	159	0.018	0.000	0.579	43	0.029	0.000	0.319	-1.076	-1.107
BHC membership dummy	215	0.600	0.000	1.000	59	0.712	0.000	1.000	-1.573	-1.569
Core deposits/Total assets	215	0.097	-0.887	0.915	59	0.092	-0.281	0.436	0.195	0.307
Relative return on assets	215	-0.001	-0.052	0.009	59	-0.008	-0.096	0.002	5.149***	4.534***
Return on assets	215	0.002	-0.049	0.012	59	-0.005	-0.093	0.006	5.152***	4.630***
Prefailure dummy	215	0.005	0.000	1.000	59	0.034	0.000	1.000	-1.918*	-1.909*

The dependent variable *TURN* takes on the value one if either CEO, chairperson, president, CFO, or COO turnover is observed or zero otherwise. Significance denotes the values for t-test for differences in means and a Wilcoxon rank test for whether the two samples come from the same distribution respectively. Values for t-statistics are reported. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

Table 2. Nested models for market discipline (Probit Estimates)

	Panel A				*Panel B*			
	(1)	**(2)**	**(3)**	**(4)**	**(1)**	**(2)**	**(3)**	**(4)**
Risk measure	***Z-Score***	***Z-Score***	***Z-Score***	***Z-Score***	***PD***	***PD***	***PD***	***PD***
Total assets (log)	0.0201	0.1628	0.0271	0.1579	-0.0206	0.0009	-0.0140	-0.0013
	(0.2156)	(1.4162)	(0.2892)	(1.3712)	(-0.2166)	(0.0092)	(-0.1489)	(-0.0127)
Risk measure	-0.0084***	-0.0198***	-0.0075***	-0.0190***	57.1293***	9.9795	40.2316**	15.5756
	(-3.8096)	(-3.8721)	(-3.3042)	(-3.6472)	(3.0495)	(0.2875)	(1.9986)	(0.3460)
BHC dummy	0.3282	0.3013	0.2934	0.2952	0.1603	-0.0398	0.1485	-0.0436
	(1.6323)	(1.2903)	(1.4289)	(1.2630)	(0.7717)	(-0.1756)	(0.7084)	(-0.1920)
Subordinated debt/Total assets	81.0728*	-5.5821	77.0933*	-2.6293	80.0345*	41.0449	79.5330*	41.3172
	(1.8303)	(-0.0869)	(1.7963)	(-0.0413)	(1.7814)	(0.8829)	(1.8005)	(0.8883)
Core deposits/Total assets	0.2830	1.0468*	0.3700	1.0430*	-0.1790	-0.3147	-0.0830	-0.2895
	(0.5449)	(1.6614)	(0.7098)	(1.6645)	(-0.2996)	(-0.4896)	(-0.1409)	(-0.4426)
Total assets (log) * Risk measure		0.0106***		0.0103***		9.0235		8.9739
		(4.0175)		(3.8729)		(0.3715)		(0.3759)
BHC dummy * Risk measure		-0.0023		-0.0024		69.6194		75.9826*
		(-0.5145)		(-0.5382)		(1.5856)		(1.8579)
Subordinated debt/Total assets * Risk measure		-4.5546***		-4.3246***		417,398.4306**		416,072.7587**
		(-3.2208)		(-2.8979)		(1.9909)		(1.9904)
Core deposits/Total assets* Risk measure		0.0198*		0.0189		180.7570		138.4377
		(1.6925)		(1.6111)		(0.7886)		(0.5169)
SI dummy			0.5076				0.4787	
			(1.6052)				(1.3247)	
SI dummy * Risk measure				-0.0039				-15.9746
				(-0.6155)				(-0.2843)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	283	283	283	283	269	269	269	269

The dependent variable *TURN* takes on the value one if either CEO, chairperson, president, CFO, or COO turnover is observed or zero otherwise. The regressions in Panel A use Z-Scores as risk measure, whereas PDs are used as a measure of risk in Panel B. Robust z statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3. Separate models for debtholder, shareholder, and supervisory discipline (Probit Estimates)

Model	*Debtholder model*				*Shareholder model*						*Supervisory model*	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
Risk measure	***Z-Score***	***Z-Score***	***PD***	***PD***	***Z-Score***	***Z-Score***	***Z-Score***	***PD***	***PD***	***PD***	***Z-Score***	***PD***
Total assets (log)	0.0712 (-0.7659)	0.0887 (-1.0262)	0.0074 (-0.0802)	0.0301 (-0.3343)	0.0804 (-0.9307)	0.0621 (-0.6896)	0.1043 (-1.1951)	0.0529 (-0.5549)	0.0422 (-0.4421)	0.0564 (-0.6023)	0.0731 (-0.8359)	0.0337 (-0.3853)
Risk measure	-0.0074*** (-3.5180)	-0.0088*** (-4.0085)	40.5356* (-1.7888)	62.4064** (-2.3942)	-0.0073*** (-3.3191)	-0.0084** (-2.3321)	-0.0075*** (-3.3896)	65.4862*** (-4.1764)	-7.3265 (-0.1884)	54.8563* (-1.9018)	-0.0063*** (-2.9566)	32.2114 (-0.7615)
Core deposits/Total assets		0.4546 (-0.7946)		-0.0153 (-0.0232)			0.8061 (-1.3827)			1.0205 (-1.4907)		
Core deposits/Total assets * Risk measure		-0.0026 (-0.2403)		28.4197 (-0.1431)			-0.0082 (-0.7726)			-120.7668 (-0.5152)		
Subordinated debt/Total assets	-13.4188 (-0.1825)		41.4291 (-0.9016)									
Subordinated debt/Total assets * Risk measure	-4.6930*** (-2.7302)		401,400.9939** (-2.0439)									
Relative profits					0.009 (-0.2115)	-0.0539* (-1.7978)	-0.0604* (-1.7016)	-0.1074*** (-3.2320)	-0.0943*** (-2.8716)	-0.0875*** (-2.5996)		
Relative profits * Risk measure					0.0013 (-1.4883)			3.2419*** (-3.4653)				
BHC dummy						0.3997* (-1.8641)			0.012 (-0.0525)			
BHC dummy * Risk measure						0.0017 (-0.3904)			104.2914** (-2.2038)			
SI dummy											-0.5004 (-0.9455)	0.4294 (-1.0687)
SI dummy * Risk measure											-0.0234** (-2.5503)	15.0639 (-0.3393)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	283	283	269	269	283	283	283	269	269	269	283	269

The dependent variable takes on the value one if either CEO, chairperson, president, CFO, or COO turnover is observed or zero otherwise. We report separate regressions for the debtholder, the shareholder and the supervisory model. Robust z statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Robustness tests (Probit Estimates)

	Panel A						*Panel B*					
Model	***(1) Top Executive Z-Score***	***(2) Top Executive Z-Score***	***(3) Ordered Probit Z-Score***	***(4) Ordered Probit Z-Score***	***(5) Merger adjustment Z-Score***	***(6) Merger adjustment Z-Score***	***(1) Top Executive PD***	***(2) Top Executive PD***	***(3) Ordered Probit PD***	***(4) Ordered Probit PD***	***(5) Merger adjustment PD***	***(6) Merger adjustment PD***
Risk Measure												
Total assets (log)	0.0330	0.1779	0.0462	0.1731*	-0.0234	0.1015	-0.0039	0.0135	0.0001	-0.0235	-0.0463	-0.0096
	(0.35)	(1.52)	(0.52)	(1.67)	(-0.24)	(0.85)	(-0.041)	(0.14)	(0.0014)	(-0.25)	(-0.46)	(-0.091)
Risk measure	-0.0083***	-0.0203***	-0.0082***	-0.0195***	-0.0065***	-0.0185***	56.2884***	9.0162	12.2369*	7.5996	44.8804**	-0.3637
	(-3.77)	(-3.86)	(-3.69)	(-4.30)	(-2.99)	(-3.60)	(3.05)	(0.26)	(1.80)	(0.23)	(2.54)	(-0.010)
BHC dummy	0.2742	0.2621	0.2913	0.2629	0.3663*	0.3835	0.0850	-0.0960	0.1763	0.1091	0.2156	0.0302
	(1.35)	(1.11)	(1.48)	(1.12)	(1.72)	(1.56)	(0.41)	(-0.43)	(0.86)	(0.49)	(0.99)	(0.13)
Subordinated debt/Total assets	76.0162*	-6.3319	89.9048**	27.9276	144.6398***	67.4390	70.6683	41.0866	93.8322**	98.0276**	135.2060**	71.2541
	(1.72)	(-0.099)	(2.11)	(0.58)	(2.67)	(1.17)	(1.60)	(0.89)	(2.02)	(2.07)	(2.51)	(1.20)
Core deposits/Total assets	0.3223	1.0764*	0.3913	1.0999*	-0.0236	0.8511	-0.0840	-0.2812	-0.2081	-0.2029	-0.3249	-0.3958
	(0.62)	(1.69)	(0.72)	(1.74)	(-0.045)	(1.28)	(-0.14)	(-0.43)	(-0.33)	(-0.29)	(-0.53)	(-0.60)
Total assets (log) * Risk measure		0.0107***		0.0096***		0.0104***		8.4889		24.2320		6.3835
		(3.96)		(4.27)		(3.99)		(0.35)		(1.46)		(0.24)
BHC dummy * Risk measure		-0.0020		-0.0011		-0.0005		73.1469*		43.5150		61.7405
		(-0.45)		(-0.26)		(-0.11)		(1.66)		(1.16)		(1.40)
Subordinated debt/Total assets * Risk measure		-4.5730***		-2.7208***		-5.4095**		436,476.8772*		-6,333.5272**		355,245.4152**
		(-3.04)		(-2.61)		(-2.57)		(1.95)		(-2.50)		(2.37)
Core deposits/Total assets* Risk measure		0.0200*		0.0169		0.0202*		183.6228		120.9216		164.5049
		(1.71)		(1.45)		(1.65)		(0.80)		(0.90)		(0.71)
Observations	281	281	283	283	256	256	267	267	269	269	239	239

In Panel A, we report robustness tests based on Z-Scores as a measure of risk, and Panel B uses probability of default as a measure of risk. In Columns (1) and (2) we use a different dependent variable and constrain the definition of an executive to a bank's chairperson, president, or CEO. Columns (3) and (4) use ordered probit models whereby the nodes are constructed by summing across the different roles of the executives. We adjust our models for corporate control activity in Columns (5) and (6) and remove those banks from the sample that were involved in mergers as either targets or acquirers in a one year time window surrounding the departure date of the executive. Robust z statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1